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(FILE 'HOME' ENTERED AT 11:15:47 ON 18 DEC 1999)

FILE 'REGISTRY' ENTERED AT 11:15:52 ON 18 DEC 1999

L1 97 (0<CU<5 AND 0<MG<6 AND 0<LI<1 AND 50<AL)/MAC

FILE 'HCA' ENTERED AT 11:16:30 ON 18 DEC 1999

L2 130 L1
L3 4476 (ALUMINUM OR AL) AND (COPPER OR CU) AND (LITHIUM OR LI) AND
(MA
L4 63 L2 AND L3
SELECT L4 1- IPC
L5 371029 E1-E28
L6 504 L5 AND L3
L7 0 (ALUMINUM RO AL) (1A) (BASE? OR ALLOY OR BALANC? OR REMAIN? OR
RE
L8 125719 (ALUMINUM OR AL) (1A) (BASE? OR ALLOY OR BALANC? OR REMAIN? OR
RE
L9 328 L6 AND L8
L10 206 L9 AND (CR OR V OR TI OR ZR) AND (MN OR NI OR FE OR HF)
L11 181 L10 NOT L4
L12 165 L11 AND (ZN OR AG OR SI)
E RIOJA ROBERTO/IN,AU
L13 14 E5-6
E STALEY JAMES/IN,AU
L14 35 E8-E9
E BRAY GARY/AU,IN
L15 9 E5-E7
L16 56 L13 OR L14 OR L15
L17 17 L16 AND L8 AND (CR OR V OR TI OR ZR) AND (MN OR NI OR FE OR
HF)
L18 10 L17 NOT (L4 OR L12)

AN 131:160372 HCA
 TI High-strength **aluminum-magnesium** alloys for
 application in welded construction
 IN Haszler, Alfred Johann Peter; Sampath, Desikan
 PA Hoogovens Aluminium Walzprodukte G.m.b.H., Germany
 SO PCT Int. Appl., 20 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|------------|---|----------|-----------------|----------|
| PI | WO 9942627 | A1 | 19990826 | WO 1999-EP1011 | 19990218 |
| | W: | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, | | | |
| TM | RW: | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | |

PRAI EP 1998-200560 19980220

AB The **Al-Mg** alloys suitable for extrusions or rolled strip contain **Mg** >3.0 to 4.5 (esp. 3.5-4.5), Mn 0.4-1.2, Zn 0.4-1.7, Zr 0.05-0.25, Cr .ltoreq.0.3, Ti .ltoreq.0.2, V .ltoreq.0.2, Li .ltoreq.0.5, Sc .ltoreq.0.5, Fe .ltoreq.0.5, Si .ltoreq.0.5, Cu .ltoreq.0.15, and Ag .ltoreq.0.4% with impurities .ltoreq.0.05 each and .ltoreq.0.15% total. The **Al-Mg** alloy is suitable for manuf. of high-strength containers or welded structural parts, esp. for operation near 80-100.degree.. The alloy ingot is typically preheated at 300-530.degree. to decrease segregation, hot rolled, and optionally finished by cold rolling, and the resulting strip is heat treated for high-strength applications and corrosion resistance. The typical alloy for manuf. of the strip 1.2 mm thick with longitudinal tensile strength of 292 MPa contains **Mg** 3.9, Mn 0.74, Zn 0.53, Zr 0.13, Cr 0.05, Ti 0.02, Fe 0.31, Si 0.14, and **Cu** 0.05%. The alloy strength and ductility are comparable to those of the low-Zn AA

5083

Al-alloy strip susceptible to sensitized and intergranular corrosion.

AN 130:240658 HCA
 TI **Aluminum** alloys for extrusion and their production method
 including casting process with element addition
 IN Kikuchi, Masao; Saga, Makoto
 PA Nippon Steel Corp., Japan
 SO Jpn. Kokai Tokkyo Koho, 13 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---|------|----------|-----------------|----------|
| PI | JP 11061312 | A2 | 19990305 | JP 1997-232545 | 19970828 |
| AB | <p>The Al alloys contain Si .ltoreq.1.2, Fe .ltoreq.1.5, Cu .ltoreq.0.50, Mn .ltoreq.1.5, Mg 2.0-8.0, Cr .ltoreq.0.35, Zn .ltoreq.0.50, and Ti .ltoreq.0.20% and have no. of crystals having max. diam. .gtoreq.40 .mu.m .ltoreq.200/mm2 in cross section of billets for extrusion and no. of crystals having ratio of (max. diam)/(min. diam.) .gtoreq.5.0 .ltoreq.100/mm2. Alternatively, the alloys contain (a) 0.2-1.5% each of Si and Mg or (b) Cu .ltoreq.3.0, Mg 0.2-3.0, and Zn 1.0-8.0% instead of the above ratio of each element. In the manuf. of the alloys by melting, casting, and soaking to form billets, 0.005-0.3% in total of Na, Sr, Sb, Ca, Te, Ba, Li, K, Bi, P, As, and/or Se is added during the casting process. The alloys have good extrusion property, mech. properties, corrosion resistance, and secondary workability even though they are manufd. by recycling scraps as raw materials.</p> | | | | |

AN 130:240657 HCA
TI **Aluminum** alloy strips and their production for automobile body panels

IN Kikuchi, Masao; Takada, Takeshi

PA Nippon Steel Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|--|------|----------|-----------------|----------|
| PI | JP 11061311 | A2 | 19990305 | JP 1997-232526 | 19970828 |
| AB | The Al alloy strips contain Si .ltoreq.1.2, Fe .ltoreq.1.5, Cu .ltoreq.0.50, Mn .ltoreq.0.80, Mg 2.0-8.0, Cr .ltoreq.0.35, Zn .ltoreq.0.50, and Ti .ltoreq.0.20% and have no. of crystals having max. diam. .gtoreq.10 .mu.m .ltoreq.300/mm2 in cross section of rolling direction and no. of crystals having ratio of (max. diam)/(min. diam.) .gtoreq.3.5 .ltoreq.100/mm2. In the manuf. of the alloy strips, 0.005-0.3% in total of Na, Sr, Sb, Ca, Te, Ba, Li , K, Bi, P, As, and/or Se is added during casting process. The strips have improved moldability and corrosion resistance even though they are manufd. by recycling scraps as raw materials. | | | | |

Examiner: E. Con

AN 104:23136 HCA
 TI **Aluminum-lithium** alloys
 IN Sawtell, Ralph R.; Bretz, Philip E.; Hunt, Warren H.
 PA Aluminum Co. of America, USA
 SO Eur. Pat. Appl., 23 pp.
 CODEN: EPXXDW
 DT Patent
 LA English
 FAN.CNT 8

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|-----------------------------------|------|----------|-----------------|----------|
| PI | EP 157600 | A2 | 19851009 | EP 1985-302169 | 19850328 |
| | EP 157600 | A3 | 19870916 | | |
| | EP 157600 | B1 | 19920701 | | |
| | R: CH, DE, FR, GB, IT, LI, NL, SE | | | | |
| | US 4648913 | A | 19870310 | US 1984-594344 | 19840329 |
| | AU 8538094 | A1 | 19851003 | AU 1985-38094 | 19850125 |
| | AU 573683 | B2 | 19880616 | | |
| | CA 1228490 | A1 | 19871027 | CA 1985-475903 | 19850307 |
| | NO 8501267 | A | 19850930 | NO 1985-1267 | 19850328 |
| | BR 8501422 | A | 19851126 | BR 1985-1422 | 19850328 |
| | JP 60221543 | A2 | 19851106 | JP 1985-66407 | 19850329 |
| | US 4897126 | A | 19900130 | US 1988-213722 | 19880630 |
| | US 5135713 | A | 19920804 | US 1990-588410 | 19900926 |
| PRAI | US 1984-594344 | | 19840329 | | |
| | US 1984-685731 | | 19841224 | | |
| | US 1988-149802 | | 19880128 | | |
| | US 1988-172506 | | 19880324 | | |

AB High toughness in combination with tensile strength is obtained in
 aircraft alloys contg. **Li** 0.5-4, **Mg** 0-5.0, **Cu**
 0-5.0, **Zr** 0-1.0, **Mn** 0-2.0, **Zn** 0-7, **Fe** <0.5, and **Si** <0.5%. The wrought
 bar

or strip is soln.-treated, quenched, stretched >3%, and aged at
 150-400.degree.F. Tensile strength of 50-85 kpsi is typically achieved
 with fracture toughness 25-75 kpsi-in0.5. Thus, **Al** alloy ingot
 contg. **Li** 1.73, **Cu** 2.63, and **Zr** 0.12% was homogenized
 24 h at 1000.degree.F, and hot-rolled into plates 1 in. thick. The plate
 was soln. heat treated 1 h at 1025.degree.F, quenched in water at
 70.degree.F, stretched 2 or 6%, and aged at 325 or 375.degree.F. Tensile
 strength and fracture toughness were higher after stretching to 6%,
 compared with 2%.

Edman 2-2-78

AN 107:119640 HCA
TI **Aluminum-lithium** alloys and method of making the same
IN Cho, Chul Won
PA Aluminum Co. of America, USA
SO PCT Int. Appl., 46 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 8

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|----------|----------|-----------------|----------|
| PI | WO 8703011 | A1 | 19870521 | WO 1986-US2545 | 19861119 |
| | W: AU, BR, JP, NO | | | | |
| | RW: AT, BE, CH, DE, FR, GB, IT, LU, NL, SE | | | | |
| | US 4806174 | A | 19890221 | US 1985-793273 | 19851119 |
| | AU 8768381 | A1 | 19870602 | AU 1987-68381 | 19861119 |
| | BR 8606987 | A | 19871201 | BR 1986-6987 | 19861119 |
| | EP 247181 | A1 | 19871202 | EP 1987-900418 | 19861119 |
| | EP 247181 | B1 | 19911002 | | |
| | R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE | | | | |
| | JP 63501883 | T2 | 19880728 | JP 1987-500396 | 19861119 |
| | CA 1283565 | A1 | 19910430 | CA 1986-523324 | 19861119 |
| | NO 8702996 | A | 19870917 | NO 1987-2996 | 19870717 |
| PRAI | US 1985-793273 | 19851119 | | | |
| | US 1984-594344 | 19840329 | | | |
| | WO 1986-US2545 | 19861119 | | | |

AB The low-d. alloys suitable for aircraft applications contain **Li** 0.5-4.0, **Mg** 0-5.0, **Cu** <5.0, **Zr** 0-1.0, **Mn** 0-2.0, **Zn** 0-7.0, and **Fe** and **Si** .1 to req. 0.5% each. A wrought product having an isotropic texture is manufd. by hot working into a preform without a dissoln. loss of grain-boundary ppts., followed by recrystn. of the preform and hot working for final shaping. The alloy is suitable for sheet manuf. and pptn. hardening. Thus, a cast ingot of **A1** alloy (contg. **Li** 1.73, **Cu** 2.63, and **Zr** 0.12%) was soaked 24 h at 1000.degree. F, and then hot-rolled into a plate (.apprx. 0.25 in). The plate was soln.-treated 1 h at 1075.degree. F, quenched in water to 70.degree. F, and stretched for 2 or 6% elongation. Plate specimens were then heat-treated at 325 or 375.degree. F for artificial aging. Fracture toughness and tensile strength were improved more by stretch-forming for 6% than for 2%.

Examiner's Copy

AN 110:139903 HCA
TI **Aluminum-lithium** alloy for flat-rolled product
IN Young, Kenton P.; Bowers, Joel A.; Colvin, Edward L.; Westerlund, Robert A.
PA Aluminum Co. of America, USA
SO Eur. Pat. Appl., 6 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---------------------------------------|------|----------|-----------------|----------|
| PI | EP 281076 | A1 | 19880907 | EP 1988-103080 | 19880301 |
| | EP 281076 | B1 | 19920520 | | |
| | R: CH, DE, ES, FR, GB, IT, LI, NL, SE | | | | |
| | <u>US 4790884</u> | A | 19881213 | US 1987-20600 | 19870302 |
| | CA 1308630 | A1 | 19921013 | CA 1988-560077 | 19880229 |
| | JP 63235454 | A2 | 19880930 | JP 1988-49453 | 19880302 |
| | BR 8800903 | A | 19881011 | BR 1988-903 | 19880302 |
| PRAI | US 1987-20600 | | 19870302 | | |

AB The **Al-Li** alloys for sheets or plates showing a good formability without Luder's line defect contain **Li** 0.5-4.0, **Cu** and **Mg** .ltoreq.5.0 each, Zr .ltoreq.1.0, Mn .ltoreq.2.0, Zn .ltoreq.7.0, Fe and Si .ltoreq.0.5% each, and preferably .ltoreq.0.35% impurities. A flat-rolled product is soln. heat treated and quenched; preaged at 150-270.degree.F for >6 h; stretched without forming the Luder's line defect; and then aged to stabilize mech. properties. Thus, cast alloy ingot (contg. **Li** 2.3, **Cu** 2.7, and Zr 0.1%) was heated for 24 h at 1000.degree.F for homogenizing, hot-rolled to 0.162 in. thickness, cut, and cold-rolled into strips 0.063 in. thick. The strips were heated for 60 min at 1020.degree.F, quenched in water, preaged at 230.degree.F for 100 h, and cooled in air. The strips were then stretched 1% without showing the Luder's line defect. Without the preaging treatment the stretched strips showed the defect.

Examiner's Copy

AN 116:260506 HCA
TI Two-step aging of **aluminum-lithium** alloys
IN Rioja, Roberto J.; James, R. Steve
PA Aluminum Co. of America, USA
SQ U.S., 10 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---|------|----------|-----------------|----------|
| | ----- | --- | ----- | ----- | ----- |
| PI | US 5076859 | A | 19911231 | US 1989-457099 | 19891226 |
| AB | The soln. treated articles from Al-Li alloys are aged in the 1st stage for 0.1-100 h at 250-415 .degree.F, and then in the 2nd stage (esp. for 1-1000 h) at 100-330 .degree.F for improved strength and fracture toughness. The heat treatment process is suitable for the Al alloys contg.: (a) Li 0.2-5.0, Mg 0-5.0, Cu .ltoreq. 5.0, Ag 0-2, Zr 0-1.0, Mn 0-1.0, Zn 0-9.0, Fe .ltoreq. 0.5, and/or Si .ltoreq. 0.5%; or (b) Li 0.5-4.0, Mg 0.1-6.0, Cu .gtoreq. 0.6, Zn 0.05-12, Mn 0-0.8, Zr .ltoreq. 0.15, Ag 0.05-1, Fe .ltoreq. 0.5, and/or Si .ltoreq. 0.5%. Thus, the strip specimens from AA 2090 alloy were aged at 300-310 .degree.F and then at 212-250 .degree.F, and showed high fracture toughness insensitive to the tensile yield strength of 72-80 kpsi. When the alloy was aged only at 325 .degree.F, the fracture toughness decreased with the higher yield strength of 70-77 kpsi. | | | | |

Examiner's Copy

AN 124:295966 HCA
TI Crystallography of heterogeneous S' & T1 precipitates in double aged
Al-Cu-Mg-(Li) Alloys
AU Oezbilen, Sedat
CS Teknik Egitim Fakultesi, Gazi Univ., Ankara, Turk.
SO Turk. J. Eng. Environ. Sci. (1996), 20(2), 103-12
CODEN: TJESec; ISSN: 1300-0160
DT Journal
LA Turkish
AB Alloys prepd. with a chem. compn. of Al-2.11%Cu-0.93%
Mg (alloy-1) and Al-2.07%Cu-0.97%Mg
-0.87%Li (alloy-2) were subjected to homogenization,
water-quenching, natural aging for 3.15 .times. 107s & artificial aging
at 463K for 2.16 .times. 104s & 8.64 .times. 104s (double aging). Selected
samples were examd. in detail under TEM. For this purpose, bright & dark
field images together with electron diffraction patterns taken from
[001],
[011], [012] & [111] Al-matrix directions were used. It was obsd. that
there was an effect of alloying elements, namely Li, Cu
, Mg on the nature & d. of lattice defects of dislocation loop
type in Al-matrix during heat treatments. In alloy-2,
Li & Cu atoms segregating on Frank & double-arc
contrast, prismatic loops cause the formation of T1 (Al₂CuLi) ppts.
during double aging; in alloys-1 & 2, Cu & Mg atoms
segregating on unfaulted & orthorhombic, prismatic dislocation loops
cause the formation of heterogeneous S' (Al₂CuMg) ppts. on these dislocation
loops during the same heat treatment.

Examiner: Grg

AN 118:85846 HCA
TI **Aluminum-lithium-zinc** alloys for extruded parts having
a low aspect ratio
IN Witters, Jeffrey J.; Cheney, Brian A.; Rioja, Roberto J.
PA Aluminum Co. of America, USA
SO PCT Int. Appl., 21 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|--|------|----------|-----------------|----------|
| | ----- | --- | ----- | ----- | ----- |
| PI | WO 9212269 | A1 | 19920723 | WO 1991-US9808 | 19911227 |
| | W: JP | | | | |
| | RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE | | | | |
| | US 5151136 | A | 19920929 | US 1990-634901 | 19901227 |
| | EP 517884 | A1 | 19921216 | EP 1992-902697 | 19911227 |
| | R: DE, FR, GB | | | | |
| | JP 05505854 | T2 | 19930826 | JP 1992-502886 | 19911227 |
| PRAI | US 1990-634901 | | 19901227 | | |
| | WO 1991-US9808 | | 19911227 | | |

AB The **Al** alloys having extruded length/thickness ratio of 1-2.5
contain **Li** 0.2-5.0 and Zn 0.05-12.0 (esp. 0.05-1%) with
Mg 0-5.0, **Cu** .ltoreq.6.5, Zr .ltoreq.1.0 Mn .ltoreq.2.0,
Ag .ltoreq.2, Fe .ltoreq.0.5, and/or Si .ltoreq.0.5%. The preferred
alloy

contains **Li** 1.5-3.0, **Cu** 2.55-2.90, **Mg**
0.2-2.5, Zn 0.2-11.0, Zr 0.08-0.12, Mn 0-1.0, and Fe and Si impurities
.ltoreq.0.1% each. The alloys optionally contain Cr, V, Sc, and/or Ti at
0.05-0.2, and/or Hf, Fe, Ni, Ag, and/or Mn at 0.05-0.6%. The starting
alloy ingot can be preformed with .gtoreq.30% size redn., followed by
heat

treatment for 1-50 h at 400-1200.degree. prior to the extrusion stage.
Tensile yield strength of the extrusions is .gtoreq.60 kpsi. Thus, the
extruded billet was manufd. from the alloy contg. **Li** 2.17,
Cu 2.79, Zn 0.49, **Mg** 0.25, Zr 0.07, Mn 0.35, and V
0.08%. After thermomech. treatment and final aging (30 h at 310
.degree.F), tensile strength was 78 kpsi, yield point 71.2 kpsi, and
elongation 6.8%. Com. AA 2091 **Al** alloy after the same
processing showed 70 kpsi, 69.4 kpsi, and 1.6% resp.

Examiner Card

AN 110:139903 HCA
TI **Aluminum-lithium** alloy for flat-rolled product
IN Young, Kenton P.; Bowers, Joel A.; Colvin, Edward L.; Westerlund, Robert
A.
PA Aluminum Co. of America, USA
SO Eur. Pat. Appl., 6 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---------------------------------------|------|----------|-----------------|----------|
| | ----- | ---- | ----- | ----- | ----- |
| PI | EP 281076 | A1 | 19880907 | EP 1988-103080 | 19880301 |
| | EP 281076 | B1 | 19920520 | | |
| | R: CH, DE, ES, FR, GB, IT, LI, NL, SE | | | | |
| | US 4790884 | A | 19881213 | US 1987-20600 | 19870302 |
| | CA 1308630 | A1 | 19921013 | CA 1988-560077 | 19880229 |
| | JP 63235454 | A2 | 19880930 | JP 1988-49453 | 19880302 |
| | BR 8800903 | A | 19881011 | BR 1988-903 | 19880302 |
| PRAI | US 1987-20600 | | 19870302 | | |

AB The **Al-Li** alloys for sheets or plates showing a good formability without Luder's line defect contain **Li** 0.5-4.0, **Cu** and **Mg** .ltoreq.5.0 each, **Zr** .ltoreq.1.0, **Mn** .ltoreq.2.0, **Zn** .ltoreq.7.0, **Fe** and **Si** .ltoreq.0.5% each, and preferably .ltoreq.0.35% impurities. A flat-rolled product is soln. heat treated and quenched; preaged at 150-270.degree.F for >6 h; stretched without forming the Luder's line defect; and then aged to stabilize mech. properties. Thus, cast alloy ingot (contg. **Li** 2.3, **Cu** 2.7, and **Zr** 0.1%) was heated for 24 h at 1000.degree.F for homogenizing, hot-rolled to 0.162 in. thickness, cut, and cold-rolled into strips 0.063 in. thick. The strips were heated for 60 min at 1020.degree.F, quenched in water, preaged at 230.degree.F for 100 h, and cooled in air. The strips were then stretched 1% without showing the Luder's line defect. Without the preaging treatment the stretched strips showed the defect.

Examiner's Copy

AN 90:126079 HCA
TI **Aluminum** alloy with improved weldability
IN Sperry, Philip R.; Mandigo, Frank N.
PA Swiss Aluminium Ltd., Switz.
SO Ger. Offen., 17 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN. CNT 2

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|------------|------|----------|-----------------|----------|
| | ----- | ---- | ----- | ----- | ----- |
| PI | DE 2810932 | A1 | 19781012 | DE 1978-2810932 | 19780314 |
| | US 4094705 | A | 19780613 | US 1977-781718 | 19770328 |

PRAI US 1977-781718 19770328

AB High-strength formable **Al** alloy [69508-78-7] suitable for resistance welding contains **Mg** 2-4, **Li** 0.4-0.8, Mn 0.1-0.7, Fe .ltoreq.0.45, Si .ltoreq.0.45, **Cu** .ltoreq.10.2, Cr .ltoreq.0.4, Ti 0.1-0.2, Zn .ltoreq.0.3, Ni .ltoreq.0.3, V 0.05-0.15 and Zr .ltoreq.0.15%. The alloy contains **Li** in solid soln. and shows higher elec. resistance than **Li**-free alloys when rolled to sheet and annealed.

Exam? or Copy

AN 116:260506 HCA
TI Two-step aging of **aluminum-lithium** alloys
IN Rioja, Roberto J.; James, R. Steve
PA Aluminum Co. of America, USA
SO U.S., 10 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|------------|------|----------|-----------------|----------|
| | ----- | ---- | ----- | ----- | ----- |
| PI | US 5076859 | A | 19911231 | US 1989-457099 | 19891226 |

AB The soln. treated articles from **Al-Li** alloys are aged in the 1st stage for 0.1-100 h at 250-415 .degree.F, and then in the 2nd stage (esp. for 1-1000 h) at 100-330 .degree.F for improved strength and fracture toughness. The heat treatment process is suitable for the **Al** alloys contg.: (a) **Li** 0.2-5.0, **Mg** 0-5.0, **Cu** .ltoreq. 5.0, Ag 0-2, Zr 0-1.0, Mn 0-1.0, Zn 0-9.0, Fe .ltoreq. 0.5, and/or Si .ltoreq. 0.5%; or (b) **Li** 0.5-4.0, **Mg** 0.1-6.0, **Cu** .gtoreq. 0.6, Zn 0.05-12, Mn 0-0.8, Zr .ltoreq. 0.15, Ag 0.05-1, Fe .ltoreq. 0.5, and/or Si .ltoreq. 0.5%. Thus, the strip specimens from AA 2090 alloy were aged at 300-310 .degree.F and then at 212-250 .degree.F, and showed high fracture toughness insensitive to the tensile yield strength of 72-80 kpsi. When the alloy was aged only at 325 .degree.F, the fracture toughness decreased with the higher yield strength of 70-77 kpsi.

Elum - ... Co

AN 107:119640 HCA
 TI **Aluminum-lithium** alloys and method of making the same
 IN Cho, Chul Won
 PA Aluminum Co. of America, USA
 SO PCT Int. Appl., 46 pp.
 CODEN: PIXXD2

DT Patent
 LA English

FAN.CNT 8

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|----------|-----------------|----------|
| PI | WO 8703011 | A1 | 19870521 | WO 1986-US2545 | 19861119 |
| | W: AU, BR, JP, NO | | | | |
| | RW: AT, BE, CH, DE, FR, GB, IT, LU, NL, SE | | | | |
| | US 4806174 | A | 19890221 | US 1985-793273 | 19851119 |
| | AU 8768381 | A1 | 19870602 | AU 1987-68381 | 19861119 |
| | BR 8606987 | A | 19871201 | BR 1986-6987 | 19861119 |
| | EP 247181 | A1 | 19871202 | EP 1987-900418 | 19861119 |
| | EP 247181 | B1 | 19911002 | | |
| | R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE | | | | |
| | JP 63501883 | T2 | 19880728 | JP 1987-500396 | 19861119 |
| | CA 1283565 | A1 | 19910430 | CA 1986-523324 | 19861119 |
| | NO 8702996 | A | 19870917 | NO 1987-2996 | 19870717 |
| PRAI | US 1985-793273 | | 19851119 | | |
| | US 1984-594344 | | 19840329 | | |
| | WO 1986-US2545 | | 19861119 | | |

AB The low-d. alloys suitable for aircraft applications contain **Li** 0.5-4.0, **Mg** 0-5.0, **Cu** <5.0, **Zr** 0-1.0, **Mn** 0-2.0, **Zn** 0-7.0, and **Fe** and **Si** .ltoreq.0.5% each. A wrought product having an isotropic texture is manufd. by hot working into a preform without a dissoln. loss of grain-boundary ppts., followed by recrystn. of the preform and hot working for final shaping. The alloy is suitable for sheet manuf. and pptn. hardening. Thus, a cast ingot of **Al** alloy (contg. **Li** 1.73, **Cu** 2.63, and **Zr** 0.12%) was soaked 24 h at 1000.degree. F, and then hot-rolled into a plate (.apprx.0.25 in). The plate was soln.-treated 1 h at 1075.degree. F, quenched in water to 70.degree. F, and stretched for 2 or 6% elongation. Plate specimens were then heat-treated at 325 or 375.degree. F for artificial aging. Fracture toughness and tensile strength were improved more by stretch-forming for 6% than for 2%.

AN 104:23136 HCA
 TI **Aluminum-lithium** alloys
 IN Sawtell, Ralph R.; Bretz, Philip E.; Hunt, Warren H.
 PA Aluminum Co. of America, USA
 SO Eur. Pat. Appl., 23 pp.
 CODEN: EPXXDW

DT Patent
 LA English

FAN.CNT 8

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|-----------------------------------|------|----------|-----------------|----------|
| PI | EP 157600 | A2 | 19851009 | EP 1985-302169 | 19850328 |
| | EP 157600 | A3 | 19870916 | | |
| | EP 157600 | B1 | 19920701 | | |
| | R: CH, DE, FR, GB, IT, LI, NL, SE | | | | |
| | US 4648913 | A | 19870310 | US 1984-594344 | 19840329 |
| | AU 8538094 | A1 | 19851003 | AU 1985-23094 | 19850125 |
| | AU 573683 | B2 | 19880616 | | |
| | CA 1228490 | A1 | 19871027 | CA 1985-475903 | 19850307 |
| | NO 8501267 | A | 19850930 | NO 1985-1267 | 19850328 |
| | BR 8501422 | A | 19851126 | BR 1985-1422 | 19850328 |
| | JP 60221543 | A2 | 19851106 | JP 1985-66407 | 19850329 |
| | US 4897126 | A | 19900130 | US 1988-213722 | 19880630 |
| | US 5135713 | A | 19920804 | US 1990-588410 | 19900926 |
| PRAI | US 1984-594344 | | 19840329 | | |
| | US 1984-685731 | | 19841224 | | |
| | US 1988-149802 | | 19880128 | | |
| | US 1988-172506 | | 19880324 | | |

AB High toughness in combination with tensile strength is obtained in aircraft alloys contg. **Li** 0.5-4, **Mg** 0-5.0, **Cu** 0-5.0, **Zr** 0-1.0, **Mn** 0-2.0, **Zn** 0-7, **Fe** <0.5, and **Si** <0.5%. The wrought

bar or strip is soln.-treated, quenched, stretched >3%, and aged at 150-400.degree.F. Tensile strength of 50-85 kpsi is typically achieved with fracture toughness 25-75 kpsi-in0.5. Thus, **Al** alloy ingot contg. **Li**-1.73, **Cu** 2.63, and **Zr** 0.12% was homogenized 24 h at 1000.degree.F, and hot-rolled into plates 1 in. thick. The plate was soln. heat treated 1 h at 1025.degree.F, quenched in water at 70.degree.F, stretched 2 or 6%, and aged at 325 or 375.degree.F. Tensile strength and fracture toughness were higher after stretching to 6%, compared with 2%.

Examination

AN 124:124235 HCA
TI **Aluminum**-scandium alloys for welding rods and welded
construction
IN Tack, William Troy; Hansson, Inge L. H.
PA Ashurst Corp., USA
SO PCT Int. Appl., 139 pp
CODEN: PIXXD2
DT Patent
LA English

FAN.CNT 2

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|------------|--|----------|-----------------|----------|
| | | | | WO 1995-US6684 | 19950524 |
| PI | WO 9532074 | A2 | 19951130 | | |
| | WO 9532074 | A3 | 19960314 | | |
| | W: | AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT | | | |
| | RW: | KE, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | | | |
| | US 5620652 | A | 19970415 | US 1995-410801 | 19950327 |
| | AU 9526515 | A1 | 19951218 | AU 1995-26515 | 19950524 |
| | EP 760727 | A1 | 19970312 | EP 1995-921434 | 19950524 |
| | R: | AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, | | | |

SE JP 10505282 T2 19980526 JP 1995-530546 19950524
NO 9604958 A 19970114 NO 1996-4958 19961121

PRAI US 1994-249023 19940525
US 1995-410801 19950327
WO 1995-US6684 19950524

AB The Ce-contg. alloys with .gtoreq.60% **Al** are suitable for welding rods and welded construction, and typically contain Sc 0.02-10.0 (esp. 0.1-0.5) and Zr 0.05-0.22%. The welding process is suitable for manuf. of bicycle frames from tubular preforms. The typical **Al** alloys for structural applications contain **Cu** 1.5-3.1, **Mg** 1.0-2.1, Fe 0.5-1.7, Ni 0.6-1.5, Ti 0.04-0.10, Si 0.10-0.25, Sc 0.02-10.0, and Zr 0.1-1.0%. The **Al** alloys with **Li** typically contain **Cu** 3.5-5.5, **Li** 0.40-2.0, Ag 0.01-0.80, **Mg** 0.01-1.5, Sc 0.02-0.5, and Zr 0.0-1.0%. The **Al** alloys with Zn typically contain Zn 4.0-9.0, **Mg** 0.6-3.8, **Cu** 0.1-3.0, Sc 0.02-10.0, and optionally Zr 0.0-1.0%. The alloys are suitable for structural applications in transportation and sport-oriented equipment.

Example - 28

AN 110:235863 HCA
TI Manufacture of high-strength **aluminum** alloy without solution
treatment
IN Uno, Teruo; Hirano, Seiichi
PA Sumitomo Light Metal Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF

DT Patent
LA Japanese

FAN. CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|-------------|------|----------|-----------------|----------|
| JP 01025954 | A2 | 19890127 | JP 1987-178850 | 19870720 |
| JP 03066387 | B4 | 19911017 | | |

PI JP 01025954
JP 03066387

AB The **Al** alloy for aircraft is manufd. from a billet contg.
Cu 0.5-5.0, **Li** 0.5-4.0, **Mg** 0, 0.5-6.0,
optional **Cr** 0.05-0.30, **Mn** 0.05-1.0, **Zr** 0.05-0.30, and/or **V** 0.05-0.30% by
soaking at 520-550.degree. for 2-48 h, heating at 450-520.degree.,
extruding, air cooling, and artificially aging. Thus, a billet of the
Al alloy contg. **Li** 2.1, **Cu** 2.7, **Si** 0.04, **Fe**
0.05, **Ti** 0.02, **B** 0.002, and **Be** 0.0005% was soaked at 530.degree., heated
at 480.degree., extruded into a rod, cooled, and aged at 175.degree. to
show tensile strength 47.0 kg/mm², yield point 40.1 kg/mm², and
elongation
8%.

4/11/1996

AN 124:295966 HCA
 TI Crystallography of heterogeneous S' & T1 precipitates in double aged
Al-Cu-Mg-(Li) Alloys
 AU Oezbilen, Sedat
 CS Teknik Egitim Fakultesi, Gazi Univ., Ankara, Turk.
 SO Turk. J. Eng. Environ. Sci. (1996), 20(2), 103-12
 CODEN: TJSEEC; ISSN: 1300-0160
 DT Journal
 LA Turkish
 AB Alloys prepd. with a chem. compn. of **Al-2.11%Cu-0.93%**
Mg (alloy-1) and **Al-2.07%Cu-0.97%Mg**
-0.87%Li (alloy-2) were subjected to homogenization,
 water-quenching, natural aging for 3.15 .times. 107s & artificial aging
 at 463K for 2.16 .times. 104s & 8.64 .times. 104s (double aging). Selected
 samples were examd. in detail under TEM. For this purpose, bright & dark
 field images together with electron diffraction patterns taken from
 [001], [011], [012] & [111] Al-matrix directions were used. It was obsd. that
 there was an effect of alloying elements, namely **Li**, **Cu**
 , **Mg** on the nature & d. of lattice defects of dislocation loop
 type in **Al**-matrix during heat treatments. In alloy-2,
Li & **Cu** atoms segregating on Frank & double-arc
 contrast, prismatic loops cause the formation of T1 (Al₂CuLi) ppts.
 during double aging; in alloys-1 & 2, **Cu** & **Mg** atoms
 segregating on unfaulted & orthorhombic, prismatic dislocation loops
 cause the formation of heterogeneous S' (Al₂CuMg) ppts. on these dislocation
 loops during the same heat treatment.

Examined

AN 124:124235 HCA
 TI **Aluminum**-scandium alloys for welding rods and welded
 construction
 IN Tack, William Troy; Hansson, Inge L. H.
 PA Ashurst Corp., USA
 SO PCT Int. Appl., 139 pp
 CODEN: PIXXD2
 DT Patent
 LA English
 FAN.CNT 2

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|----------|-----------------|----------|
| PI | WO 9532074 | A2 | 19951130 | WO 1995-US6684 | 19950524 |
| | WO 9532074 | A3 | 19960314 | | |
| | W: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT | | | | |
| | RW: KE, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | | | | |
| | US 5620652 | A | 19970415 | US 1995-410801 | 19950327 |
| | AU 9526515 | A1 | 19951218 | AU 1995-26515 | 19950524 |
| | EP 760727 | A1 | 19970312 | EP 1995-921434 | 19950524 |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE | | | | |
| SE | JP 10505282 | T2 | 19980526 | JP 1995-530546 | 19950524 |
| | NO 9604958 | A | 19970114 | NO 1996-4958 | 19961121 |
| PRAI | US 1994-249023 | | 19940525 | | |
| | US 1995-410801 | | 19950327 | | |
| | WO 1995-US6684 | | 19950524 | | |
| AB | The Ce-contg. alloys with .gtoreq.60% Al are suitable for welding rods and welded construction, and typically contain Sc 0.02-10.0 (esp. 0.1-0.5) and Zr 0.05-0.22%. The welding process is suitable for manuf. of bicycle frames from tubular preforms. The typical Al alloys for structural applications contain Cu 1.5-3.1, Mg 1.0-2.1, Fe 0.5-1.7, Ni 0.6-1.5, Ti 0.04-0.10, Si 0.10-0.25, Sc 0.02-10.0, and Zr 0.1-1.0%. The Al alloys with Li typically contain Cu 3.5-5.5, Li 0.40-2.0, Ag 0.01-0.80, Mg 0.01-1.5, Sc 0.02-0.5, and Zr 0.0-1.0%. The Al alloys with Zn typically contain Zn 4.0-9.0, Mg 0.6-3.8, Cu 0.1-3.0, Sc 0.02-10.0, and optionally Zr 0.0-1.0%. The alloys are suitable for structural applications in transportation and sport-oriented equipment. | | | | |

Examiner's Copy

AN 118:85846 HCA
 TI **Aluminum-lithium**-zinc alloys for extruded parts having
 a low aspect ratio
 IN Witters, Jeffrey J.; Cheney, Brian A.; Rioja, Roberto J.
 PA Aluminum Co. of America, USA
 SO PCT Int. Appl., 21 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 FAN. CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|--|------|----------|-----------------|----------|
| PI | WO 9212269 | A1 | 19920723 | WO 1991-US9808 | 19911227 |
| | W: JP | | | | |
| | RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE | | | | |
| | US 5151136 | A | 19920929 | US 1990-634901 | 19901227 |
| | EP 517884 | A1 | 19921216 | EP 1992-902697 | 19911227 |
| | R: DE, FR, GB | | | | |
| | JP 05505854 | T2 | 19930826 | JP 1992-502886 | 19911227 |
| PRAI | US 1990-634901 | | 19901227 | | |
| | WO 1991-US9808 | | 19911227 | | |

AB The **Al** alloys having extruded length/thickness ratio of 1-2.5
 contain **Li** 0.2-5.0 and **Zn** 0.05-12.0 (esp. 0.05-1%) with
Mg 0-5.0, **Cu** .ltoreq.6.5, **Zr** .ltoreq.1.0 **Mn** .ltoreq.2.0,
Ag .ltoreq.2, **Fe** .ltoreq.0.5, and/or **Si** .ltoreq.0.5%. The preferred

alloy
 contains **Li** 1.5-3.0, **Cu** 2.55-2.90, **Mg**
 0.2-2.5, **Zn** 0.2-11.0, **Zr** 0.08-0.12, **Mn** 0-1.0, and **Fe** and **Si** impurities
 .ltoreq.0.1% each. The alloys optionally contain **Cr**, **V**, **Sc**, and/or **Ti** at
 0.05-0.2, and/or **Hf**, **Fe**, **Ni**, **Ag**, and/or **Mn** at 0.05-0.6%. The starting
 alloy ingot can be preformed with .gtoreq.30% size redn., followed by

heat
 treatment for 1-50 h at 400-1200.degree. prior to the extrusion stage.
 Tensile yield strength of the extrusions is .gtoreq.60 kpsi. Thus, the
 extruded billet was manufd. from the alloy contg. **Li** 2.17,
Cu 2.79, **Zn** 0.49, **Mg** 0.25, **Zr** 0.07, **Mn** 0.35, and **V**
 0.08%. After thermomech. treatment and final aging (30 h at 310
 .degree.F), tensile strength was 78 kpsi, yield point 71.2 kpsi, and
 elongation 6.8%. Com. AA 2091 **Al** alloy after the same
 processing showed 70 kpsi, 69.4 kpsi, and 1.6% resp.

Examiner's Copy

AN 90:126079 HCA
TI **Aluminum** alloy with improved weldability
IN Sperry, Philip R.; Mandigo, Frank N.
PA Swiss Aluminium Ltd., Switz.
SO Ger. Offen., 17 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN. CNT 2

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|----------|-----------------|----------|
| | ----- | ---- | ----- | ----- | ----- |
| PI | DE 2810932 | A1 | 19781012 | DE 1978-2810932 | 19780314 |
| | US 4094705 | A | 19780613 | US 1977-781718 | 19770328 |
| PRAI | US 1977-781718 | | 19770328 | | |

AB High-strength formable **Al** alloy [69508-78-7] suitable for resistance welding contains **Mg** 2-4, **Li** 0.4-0.8, Mn 0.1-0.7, Fe .ltoreq.0.45, Si .ltoreq.0.45, **Cu** .ltoreq.10.2, Cr .ltoreq.0.4, Ti 0.1-0.2, Zn .ltoreq.0.3, Ni .ltoreq.0.3, V 0.05-0.15 and Zr .ltoreq.0.15%. The alloy contains **Li** in solid soln. and shows higher elec. resistance than **Li**-free alloys when rolled to sheet and annealed.

Examiner: C. S.

AN 110:235863 HCA
TI Manufacture of high-strength aluminum alloy without solution treatment
IN Uno, Teruo; Hirano, Seiichi
PA Sumitomo Light Metal Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|-------------|------|----------|-----------------|----------|
| PI | JP 01025954 | A2 | 19890127 | JP 1987-178850 | 19870720 |
| | JP 03066387 | B4 | 19911017 | | |

AB The Al alloy for aircraft is manufd. from a billet contg.
Cu 0.5-5.0, Li 0.5-4.0, Mg 0, 0.5-6.0,
optional Cr 0.05-0.30, Mn 0.05-1.0, Zr 0.05-0.30, and/or V 0.05-0.30% by
soaking at 520-550.degree. for 2-48 h, heating at 450-520.degree.,
extruding, air cooling, and artificially aging. Thus, a billet of the
Al alloy contg. Li 2.1, Cu 2.7, Si 0.04, Fe
0.05, Ti 0.02, B 0.002, and Be 0.0005% was soaked at 530.degree., heated
at 480.degree., extruded into a rod, cooled, and aged at 175.degree. to
show tensile strength 47.0 kg/mm², yield point 40.1 kg/mm², and
elongation 8%.

low T_y